ARCHAEOLOGICAL IMPLICATIONS OF UNGULATE CARCASSES SCAVENGED BY ARCTIC FOXES

by Richard T. Will, Department of Anthropology, University of Alberta, Edmonton, Canada T6G 2H4

Pam:902 WILL

Rec'd: May 17/83
Order No.:
Price:
Acc. No.: Author (Grantee)

POLAR
PAM
5590

POLARPAM

ABSTRACT

A major focus of contemporary archaeology is explaining the archaeological record with respect to the cultural and natural processes which led to its formation. Excellent preservation of some archaeological sites in the Arctic makes a taphonomic orientation especially appropriate for northern research.

This paper offers empirical observations and discussions on muskox and caribou carcass scavenging by arctic foxes on northeastern Banks Island, N.W.T. An important conclusion is that more documentation on how context influences man and carnivore activity is required in order to adequately differentiate between naturally and culturally induced skeletal assemblages. During the nineteenth century, Copper Inuit hunted muskoxen on northern Banks Island. Skeletal remains at muskox killsites can resemble naturally scavenged skeletons. The presence of butcher marks on bone elements is often the only reliable criterion for associating human activity with skeletal remains of single muskoxen.

BOREAL INSTITUTE
LIBRARY

53282

Digitized by the Internet Archive
in 2022 with funding from
University of Alberta Library

https://archive.org/details/archaeologicalim00will

KEY WORDS: ARCTIC FOX, SCAVENGING, DISARTICULATION MODELS, KILL SITES, COPPER INUIT

INTRODUCTION

One kind of model archaeologists construct is aimed at identifying relationships between fossil or archaeological bone assemblages ("patterns") and the natural and cultural events that generate such products ("processes"). Field observation of processes affecting animal remains, and experimental bone alteration provide analogs for interpreting archaeological and paleontological materials. Claims for the New World antiquity of man have been hypothesized using these approaches, as have interpretations of early hominid butchery behavior (Bonnichsen, 1979; Isaac et al., 1976; Leakey, 1971; Morlan, 1981).

The development of such interpretive models is still in an early stage, and taphonomic approaches to archaeological data will consume more of the efforts of archaeologists in the future. Although many studies describing cause and effect in naturally and culturally altered bone assemblages have been completed, no one would disagree with Haynes' remark that: "More simple observations are necessary, as is more work in interpretation and theory" (1982:267).

The descriptive objective of this paper is documentation of muskox (*Ovibos moschatus* Zimmerman) and caribou (*Rangifer tarandus pearyii* Allen) carcasses recently modified by natural agents on Banks Island, N.W.T. The observed patterning among these faunal remains will be used to discuss: 1) why fox scavenging rather than wolf predation is believed to be responsible for the disturbances to the ungulate carcasses, 2) variation in fox scavenging of muskox versus caribou carcasses, 3) differences between fox and wolf utilization of ungulate carcasses, 4) problems with natural disarticulation models

in the current literature, and 5) potential difficulties which may occur in differentiating naturally modified muskox skeletal remains from "archaeological" kill-sites on Banks Island.

Before describing the ungulate remains, it is appropriate to provide the contextual background for their occurrence. Therefore, information concerning the northeastern Banks Island environment, and ecological data on contemporary muskox and caribou is presented here.

THE CONTEMPORARY ENVIRONMENT ON NORTHERN BANKS ISLAND

Osteological remains preserve well on northern Banks Island as evidenced by the thousands of mammal, bird and fish bones found in nineteenth century Copper Inuit habitation and kill sites (e.g. Hickey, 1978). Today, human utilization of animal species no longer occurs on this portion of the island; therefore, all recent death assemblages are directly attributable to processes other than cultural ones.

Muskoxen are the most abundant large mammal. Recent population estimates range from 9,400 to 19,328 animals (Latour, in Urquhart, 1982:6; Vincent and Gunn, 1981:177). Although there is controversy surrounding the actual numbers of individuals, there is consensus that muskoxen have high densities in the Thomsen and Parker River drainages (Urquhart, 1973:58; Vincent and Gunn, 1981:176). No recent population estimates for caribou exist in the literature, but the animals are not as abundant as muskoxen on Banks Island.

The only natural predator common to both muskoxen and caribou is the wolf (*Canis lupus bernardi* Anderson). Wolves are generally scarce in the

Canadian Arctic Archipelago (Riewe, 1975:209). Only three or four animals are known to have been sighted on the northeast quarter of Banks Island between 1973-1983 by various fieldworkers (C. Hickey, pers. comm.). However, high wolf predation along arctic fox traplines set out by Sachs Harbour residents resulted in a poisoning campaign during the 1950s (McEwen, 1956, cited in Usher, 1970:47). Therefore, wolves were probably more common in the past.

Wolf predation may never have been responsible for much muskoxen mortality, although this may not be true with respect to caribou exploitation. Field observational data from Bathurst Island, and Prince of Wales Island, N.W.T. indicate that arctic wolves are not frequently successful in killing adult muskoxen (Gray, 1974:25-29; Miller and Gunn, 1977:87-88). Muskoxen have anti-predator behaviors based on group defense which eliminate the opportunity for wolves to isolate individual prey. However, muskoxen behavior is not as uniform as portrayed in some reports, and frightened animals may stampede rather than group into a defense circle. Wolf predation could be successful, particularly on female and young muskoxen, when flight behavior occurs, or under certain terrain circumstances where individual animals could be surprised and isolated.

A significant source of muskox and caribou mortality on the Arctic islands is winter starvation. Prolonged, deep snow cover often prevents the animals from obtaining sufficient food. Large die-offs of both species have been reported during severe winters. During the 1973-1974 winter, for example, muskox and caribou populations were substantially reduced on Bathurst and Melville Islands, N.W.T. (Parker et al., 1975).

Another factor in muskox mortality is combat between bulls. During late summer and early fall, adult male animals sometimes compete vigorously for access to females. Head butting and charging may result in severe trauma, such as goring or broken necks. Wilkinson and Shank (1974:165-167) mention six adult male carcasses found on northern Banks Island in August 1973 which they attribute to combat deaths.

The single most important scavenger on Banks Island today is the arctic fox (*Alopex lagopus* Linnaeus). Foxes feed primarily on lemmings and other small mammals and birds during the summer. Carrion plays an important role in their winter diet (Banfield, 1981:296-297), and it will be demonstrated that fox activity accounts for almost all recent ungulate skeletal disturbance observed on Banks Island.

SCAVENGED MUSKOX AND CARIBOU CARCASSES

Eight recent muskox and caribou carcasses exhibiting various amounts of disarticulation were recorded in the vicinity of the northern Thomsen River and while on foot survey along the northeast coast (Figure. 1). When it could be determined, season of death occurred during winter.

muskox death assemblages

Muskox 1 was an adult male found lying on its stomach with legs sprawled out to the sides. When first observed at a distance, it was thought to be resting, because eight other muskoxen were grazing near the carcass. All bone elements were still articulated. An opening produced in the right flank by foxes enabled them to enter the body cavity and completely consume the contents (Plate 1). Several ribs and portions of the lumbar vertebrae were

note pages 8 + 9
bound in reverse
order.

Muskox 4 was an adult male who died several years ago. No hide or flesh remained with the skeleton. Except for a right scapula and an isolated metacarpal, no other appendicular skeletal elements were present. The skull, mandible and vertebrae anterior to the fourth thoracic were articulated. The pelvis and sacrum remained articulated to all lumbar and the posterior four thoracic vertebrae. Another section of four thoracic vertebrae with three attached ribs was present nearby. Four isolated ribs and one thoracic vertebra were also observed in the immediate area.

caribou death assemblages

Caribou 1 (Plate 3) was an antlered, adult individual. Almost no soft tissue remained adhering to the skeleton. The mandible was disarticulated from the skull and located about two meters from the rest of the skeleton. Both forelimbs were also disarticulated, and the right foreleg minus the scapula was found about six meters upslope from the assemblage. The left front leg could not be found anywhere. Both rear legs were still articulated to the pelvis but the midshaft of the left tibia had been spirally fractured. The lower left rear leg, including the distal tibia, could not be located. Flesh and skin was still present on the lower right leg beginning at the proximal metatarsal. Fox feces were present in the area.

Caribou 2 was an immature, antlered individual which had died during the winter. Very little flesh remained on the skeleton. The skull, articulated to the mandible and vertebrae anterior to the sixth thoracic, was separated from the rest of the remains by about four meters. The maxilla and anterior rib pairs were extensively gnawed by small carnivores. The only evidence of the

exposed. In addition, much of the right innominate and femur had been stripped of hide and flesh. Tiny carnivore gnaw marks were present on all exposed bone edges. Maggots, flies and fox feces were abundant in, on and around the carcass.

Muskox 2, (Plate 2) believed to be a yearling, was found lying on its right side. Bone elements present were still articulated. All ribs, except portions of the first, were removed and broken into fragments averaging about 5 cm long. These were scattered about the carcass. The left scapula was also missing, and could not be found in the vicinity of the dead animal.

Most of the hide, flesh and body contents had been eaten. Both forelimbs were stripped of flesh down to the distal end of the radiocubitus, while only the left femur had been exposed. Gnaw marks occurred along the ascending ramus, the neural and transverse spines of the vertebrae, and the proximal epiphysis of the exposed femur in the region of the greater trochanter. Muskox and fox footprints, as well as fox feces, were abundant around the carcass.

Muskox 3 was a young female found lying on her left side. All the body contents, flesh and skin down to the distal metapodial ends had been removed. Remaining bone elements were still articulated; however, both right limbs were absent and could not be located in the surrounding area. A number of ribs still remained articulated, and all of them exhibited tiny striations and gnaw marks on their distal ends. Gnawing damage was also present on the nasals, pelvis and epiphyseal surfaces of exposed longbones. Again, fox scats and chewed rib fragments were common.

right front limb was a partially destroyed scapula. The left front leg was articulated but isolated from any other skeletal portion.

The rest of the vertebral column, as well as both hind limbs, were articulated with the pelvis. Flesh had not been removed from any of the lower limbs. Extensive, small carnivore alteration had occurred on the pelvis and proximal epiphyses of the femora. A few chewed rib fragments, and fox feces were present around the remains.

Caribou 3 was an adult who had shed its antlers before death. No flesh was present on the skeleton. The skull, articulated vertebrae anterior to the ninth thoracic, and ribs were located about seven meters distant from other skeletal parts.

The pelvis and remaining articulated vertebrae were discovered down slope from the rest of the remains. The left leg was still attached to the pelvis but the foot below the astragulus was absent. A few scattered rib fragments were found; however, no other limb elements could be located. Both dentaries and the sternum were observed about seven meters upslope from the skull articulation unit. The right dentary possessed small carnivore alteration on the ascending ramus.

Caribou 4 (Plate 4) was another adult animal who had shed its antlers. No appendicular skeletal elements were present. The skull and vertebrae anterior to the seventh thoracic formed one articulation unit. A second unit, about two meters from the first, was composed of the pelvis and articulated vertebrae posterior to the eighth thoracic. The complete mandible was found nearby. A few anterior rib pairs were articulated to the column and exhibited

gnaw damage. Neural spines also possessed some small carnivore alteration. Fox feces were present around the various skeletal units.

FOX SCAVENGING VERSUS WOLF PREDATION

The presence of a demonstrably small wolf population on northern Banks Island suggests limited ungulate predation. There are additional reasons for concluding that the muskox and caribou assemblages are the result of arctic fox scavenging of carcasses and not wolf kills or scavenging. First, in seven of the eight death assemblages, there is no direct physical evidence of wolf involvement. Fox feces are abundant at most of the sites but wolf dung is not present around any of the carcasses. Carnivore gnaw marks on the muskox and caribou bones were produced by animals with very small teeth. Foxes are the only carnivores on Banks Island with appropriatly-sized teeth and overall masticatory capabilities to have produced the observed morphological patterns on bone surfaces. Foxes, however, are probably incapable of spirally fracturing limb bones so that the broken tibia observed with caribou 1 must have been caused by either wolf predation or natural injury.

Second, Parker et al., (1975) note that, among northern ungulates, it is old animals, as well as females and young which undergo the greatest amount of nutritional stress during severe winters. As mentioned earlier, large die-offs of these animal groups occasionally occur. Haynes, reporting on wolf predation on buffalo in Wood Buffalo National Park, Alberta, concludes that: "The most vulnerable animals probably die without predation during unusually severe winters and their carcasses are little utilized, if at all, since hungry wolves in packs are more inclined to hunt and kill living prey than to seek frozen

carrion for the bulk of their food" (1982:266). Muskox 1, 2 and 3 were animals who could fit this situation. However, the relative severity of the 1981-82 winter on northern Banks Island has not been determined.

DISCUSSION OF FOX SCAVENGED CARCASSES

Fox scavenged ungulate carcasses varied with respect to skeletal completeness (Figure. 2). Muskox and caribou skeletal assemblages contained complete sets of major axial parts including: skulls; mandibles; and cervical, thoracic and lumbar vertebrae. Rib fragments were common but complete ribs and sternae were rare except in instances where the body cavity was still sheathed in muscle and skin. Caudal vertebrae were associated only with muskoxen 1 and 2.

The removal of appendicular skeletal parts was more frequent in caribou scavenged assemblages than in muskox sites. The femur was present most often among remaining limb bones, and this may be because foxes encounter difficulty in disarticulating it from the innominate. The greatest difference between the two species assemblages occurred in the presence of the lower leg (that limb portion including the metapodial and below). It was twice as common in the muskox assemblages as in the caribou death sites.

These data suggest that the ability of arctic foxes to disarticulate an ungulate skeleton is dependent on the size of the carcass and its position at death. Vertebral disarticulation may not occur until several years after the initial scavenging of a muskox carcass. It can be an early activity in caribou carcass scavenging, because of the relatively smaller vertebral size, and lesser structural strength between elements. All but one caribou death assemblage contained a

vertebral disarticulation in at least one location. The disarticulation was always present among the thoracic vertebrae.

Unlike muskox carcasses, death position did not inhibit foxes from removing appendicular elements from either side of the caribou axial skeletons. The small carnivores had only limited success in scavenging muskox carcass parts lying under the weight of the rest of the animal. Carcass parts frozen to the ground in late winter may also have been too difficult for foxes to disarticulate and drag off elsewhere.

COMPARISON OF FOX AND WOLF CARCASS UTILIZATION

Pronounced differences exist between fox and wolf carcass utilization; they demonstrate that more field studies are needed to determine the full range of variation between scavenger and predator carcass utilization. Wolves have more strength and mechanical leverage in their jaws than do foxes, as well as greater overall body size and strength. Therefore, their ability to remove skeletal parts from ungulate carcasses, to disarticulate elements, and to modify individual bone elements is greater. For example, commenting on deer predation by wolves, Haynes (1982:269) states that: "Some kill sites may contain nothing more than a few dozen pieces of long bones, fragments of vertebral processes, and segments of rib shafts."

Spirally fractured limb bones, a common phenomenon in kill sites produced by wolves, are not created by foxes scavenging muskox and caribou carcasses. None of the appendicular bones observed among scavenged skeletons had their articular ends removed; however, elements taken away from the death sites may have been intensively gnawed elsewhere. On the other

hand, marrow extraction by gnawing off long bone butchery behavior (Bonnichsen, 1979; Isaac et al., 1976; Leakey,

The intensity of ungulate carcass utilization by wolves depends on a number of factors, including: the size of the wolf population and prey abundance, predation season, prey species, and whether the carcass is a fresh kill or being scavenged (Haynes, 1982). In comparison, arctic fox scavenging of ungulate remains probably depends more on carcass size and death position, as well as death season.

MODELS OF NATURAL SKELETAL UTILIZATION

Archaeologists are interested in scavenger and predator ungulate carcass utilization in order to be able to differentiate them from culturally modified bone assemblages. Hill (1979:739) writes that: "A knowledge of the way carcasses of mammals disarticulate in nature would provide a valuable comparative base against which any unique and distinctive features of hominid butchery practices may be assessed." He then proceeds to construct a model of topi (*Damaliscus korrigum* Ogilby) natural skeletal disarticulation based on a large population of skeletal remains recorded near Lake Turkana, northern Kenya.

Hill's model of natural bovid disarticulation is based on the frequency of intact joints found in the study area. According to his scheme, the most commonly found intact joint belonged to a unit which disarticulated late in the sequence. Hill did not observe the processes responsible for the disarticulation of the antelope skeletons; therefore, only their cumulative effects could be measured.

The information presented here on arctic fox scavenging demonstrates that there is considerable variation in how foxes modify muskox and caribou remains. Haynes' observations of both wolf scavenging and predation behavior document similar amounts of variation in ungulate utilization as well. Observational data strongly support the conclusion that skeletal disarticulation, both its extent and sequence, is context dependent. Therefore, models which ignore variation among natural disarticulation processes may not be appropriate for isolating features of animal carcass utilization characteristic or unique of humans.

The techniques employed to construct the topi skeletal disarticulation model are applied by Hill to material from the Olsen–Chubbuck archaeological site, Colorado. The large sample of extinct bison (*Bison occidentalis*) bones, representing many individual animals, is presumably the unique record of Paleo–Indian butchery activity. After comparing the natural and cultural sequences, the conclusion is drawn that disarticulation by humans "...may differ only slightly from that in circumstances where man has not been involved. It seems that the determining controls of the pattern are inherent in the anatomy of the dead animals itself and thus independent of the agents whereby it is realized" (Hill 1979:744).

There are two problems with this hypothesis. First, butchery behaviors are viewed as a single or unitary kind of activity. In fact, however, it cannot be assumed that they are not influenced by some of the same factors affecting natural predation. Logically, and conversely, it must be expected that decisions concerning animal carcass utilization are numerous and complex. Binford (1978), for example, points out that the cultural use of prey involves

more than simple interaction between man and animal within the natural environment. His study of caribou exploitation and consumption among Nunamiut Eskimo of Anaktuvuk Pass, Alaska, illustrates this conclusion by documenting the extreme complexity resulting from the interplay of such factors as: seasonality, availability and physical condition of prey, previous and anticipated hunting success, etc.

Second, the influence of natural processes in modifying the Olsen–Chubbuck faunal assemblage once the site was abandoned has never been determined. Carcass utilization was not intense, so that bison meat and bones left behind by the Paleo–Indian hunters must have attracted wolves and other scavengers. Unless the affects of scavenging on this osteological assemblage are known, a sequence of cultural disarticulation cannot be reconstructed with confidence.

IDENTIFYING CULTURAL KILL SITES

Naturally scavenged ungulate skeletal assemblages may in certain situations be indistinguishable from cultural kill sites. Human and carnivore meat procurement behaviors involve reduction processes which may result in skeletal parts being absent from the abandoned carcass. This situation occurs when much of the food consumption takes place away from the animal death spot in locations such as campsites or animal dens. Identifying which activities produced the discarded skeletal remains can be difficult, especially when both natural and cultural processes were involved in creating and modifying the death assemblage.

An example of ambigous interpretation is shown with some of the individual muskox kill sites found on northern Banks Island and assigned to the nineteenth century Copper Inuit occupation. Occasionally, all that remains is the skull and other axial skeletal parts. An assemblage with the same composition could have been produced by wolf predation, fox scavenging, or a combination of both activities. There are , however, some criteria which may be useful for distinguishing whether cultural or natural activities produced the questionable remains.

The skull was still articulated to the cervical vertebrae in all eight scavenged muskox and caribou skeletons. Arctic foxes are probably incapable of separating ungulate skulls from their atlas vertebra. However, head removal is an initial stage of caribou butchery practiced by Nunamiut Eskimo (Binford, 1978:51–54), and is also documented in authenticated Copper Inuit kill sites. Wolves are capable of disarticulating horse skulls from their axis vertebrae (D' Andrea and Gotthardt, 1983); however, it is not known whether they able to do the same with an animal as robust as an adult bull muskox. Muskox skull separation from other skeletal parts may be a valid criteria for diagnosing cultural activity in some situations.

Inuit butchers readily and efficiently extract flesh and bone from animal carcasses with the aid of cutting tools. Another criteria which can be used (and perhaps the only irrefutable one) to distinguish culturally induced death assemblages is the presence of incisions on bone elements. The marks are usually found on surfaces where meat units were disarticulated or sliced and stripped away from bone, such as along neural spines of thoracic vertebrae. Absence of cut marks does not necessarily imply that human activity was not

responsible for a particular skeletal assemblage, however.

Another potential distinguishing feature is the proximity and number of individual skeletons. Animals rarely die in large groups unless some type of catastrophe occurs. Wolves are not often successful in taking more than one or two animals at a time. However, Copper Inuit frequently killed groups of muskoxen while the animals were huddled in defense circles. Kill sites with as many as seventeen muskoxen represented among the skeletal remains are reported (Hickey and Steele 1978). In most cases then, a large number of ungulate skeletons found lying close together is sufficient evidence to infer Inuit activity.

Lastly, although fox scavenging activity does not result in longbone spiral fracture of either caribou or muskox limbs, it is frequently not a useful criteria for diagnosing cultural behavior, especially when no other corroborative evidence are available. It is well documented that wolves regularly spirally fracture bones, and the former presence of these carnivores on Banks Island may have been greater than it is today.

CONCLUSIONS

Understanding human behavior by explaining patterning in the archaeological record is one goal of archaeology. Therefore, it is necessary to differentiate between those physical remains left behind by man and other animals. It also means that careful documentation of variability among natural and cultural processes is a prerequisite for constructing middle range theory about past human activity.

A number of related topics have been discussed to conclude that more taphonomic research in Arctic environments needs to be undertaken in conjunction with theory building. The affects of arctic fox activity on ungulate carcasses has been shown to vary with respect to the species being scavenged. Physical and behavioral differences between wolves and foxes mean that animal carcasses are modified in different ways. Alternative processes must be distinguishable in animal disarticulation models. Otherwise, the models will not be satisfactory for archaeological inquiry. Even then, skeletal assemblages may be found for which there are no known contemporary analogs to relate pattern to process.

BIBLIOGRAPHY

Banfield, A.W.F.

1981 The Mammals of Canada. The University of Toronto Press, Toronto.

Binford, L.

1978 Nunamiut Ethnoarchaeology. Academic Press, N.Y.

Bonnichsen, R.

1979 Pleistocene bone technology in the Beringian Refugium. Mercury Series, National Museum of Canada Paper No. 89, Ottawa.

D' Andrea and R. Gotthardt

1983 Wolf kills of horses: a study of taphonomy and bone alteration. Paper presented at the 16th Annual Meetings of the Canadian Archaeological Association, Halifax.

Gray, D.R.

1974 The defense formation of the musk-ox. The Musk-ox 14:25-29.

Haynes, G.

1982 Utilization of skeletal disturbances of North American prey carcasses. Arctic 35:266-281.

Hickey, C.G.

1978 Preliminary report of an archaeological survey of north-central Banks Island, N.W.T., summer 1978. Report on file at the Prince of Wales Northern Heritage Center, Yellowknife, N.W.T.

Hickey, C.G. and D.G. Steele

1978 Of man and muskox: new light on a very old relationship. Paper presented at the 12th Annual Meetings of the Canadian

Archaeological Association, Quebec City.

Hill, A.P.

1979 Butchery and natural disarticulation: an investigatory technique. American Antiquity 44:739-744.

Isaac, G.Ll.; J.W.K. Harris; and D. Crader

1976 Archaeological evidence from the Koobi Fora Formation. In: Earliest Man and Environments in the Lake Rudolf Basin. Y. Coppens, F.C. Howell, G.Ll. Isaac, and R.E.F. Leakey (eds.), pp. 533-551. University of Chicago Press, Chicago.

Leakey, M.D.

1971 Olduvai Gorge, Vol. 3, Excavations in Beds I and II, 1960-1963. Cambridge University Press, Cambridge.

McEwen, E.H.

1956 Canis lupus bernardi Anderson, Banks Island 1955. Canadain Wildlife Service, Ottawa. Unpublished.

Miller, F.L. and A. Gunn

1977 Group of muskoxen attacked by a solitary Arctic wolf. Prince of Wales Island, Northwest Territories. Musk-ox 20:87-88.

Morlan, R.E.

1981 Taphonomy and archaeology in the Upper Pleistocene of northern Yukon Territory: A glimpse of the peopling of the New World. Mercury Series, National Museums of Canada Paper No. 94, Ottawa.

Parker, G.R., D.C. Thomas, E. Broughton, and D.R. Gray

1975 Crashes of muskox and Peary caribou populations on the Parry Islands, Arctic Canada. Canadian Wildlife Service Progress Note No. 56:1-10.

Riewe, R.R.

1975 The high Arctic wolf in the Jones Sound Region of the Canadian High Arctic. *Arctic* 28(3): 209-212.

Urquhart, D.R.

1982 Muskox. Northwest Territories Renewable Resources. Wildlife Service, Yellowknife. 37pp.

Usher, P.J.

1971 *The Bankslanders: Economy and Ecology of a Frontier Trapping Community, Vol. 2.* Northern Science Research Group, Department of Indian Affairs and Northern Development.

ACKNOWLEDGEMENTS

Financial and logistical support for this research was provided by the Boreal Institute for Northern Studies (University of Alberta, Edmonton) and The Polar Continental Shelf Project (Department of Energy, Mines and Resources, Ottawa).

Drafts of this paper were read and commented on by the following: Dr. Clifford G. Hickey, Rebecca Cole-Will, Dr. Ruth Gruhn, Jean Williams and Jeffrey Bullard. Their assistance is gratefully acknowledged.

List of Plates

Plate 1: Bull muskox carcass scavenged by arctic foxes in late winter.

Plate 2: Yearling muskox carcass stripped almost entirely of flesh by scavenging arctic foxes.

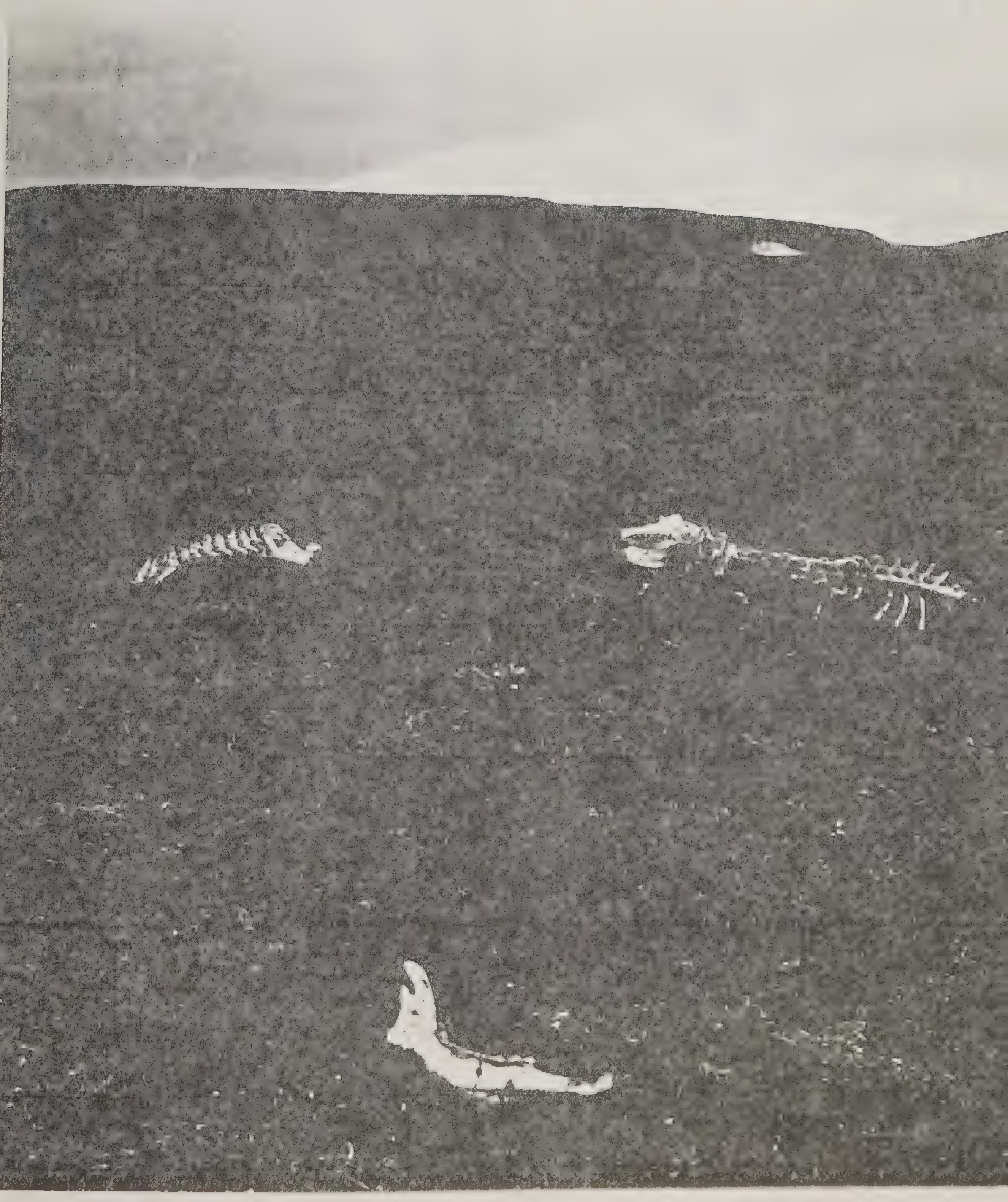
PLate 3: Remains of caribou intensively scavenged by arctic foxes.

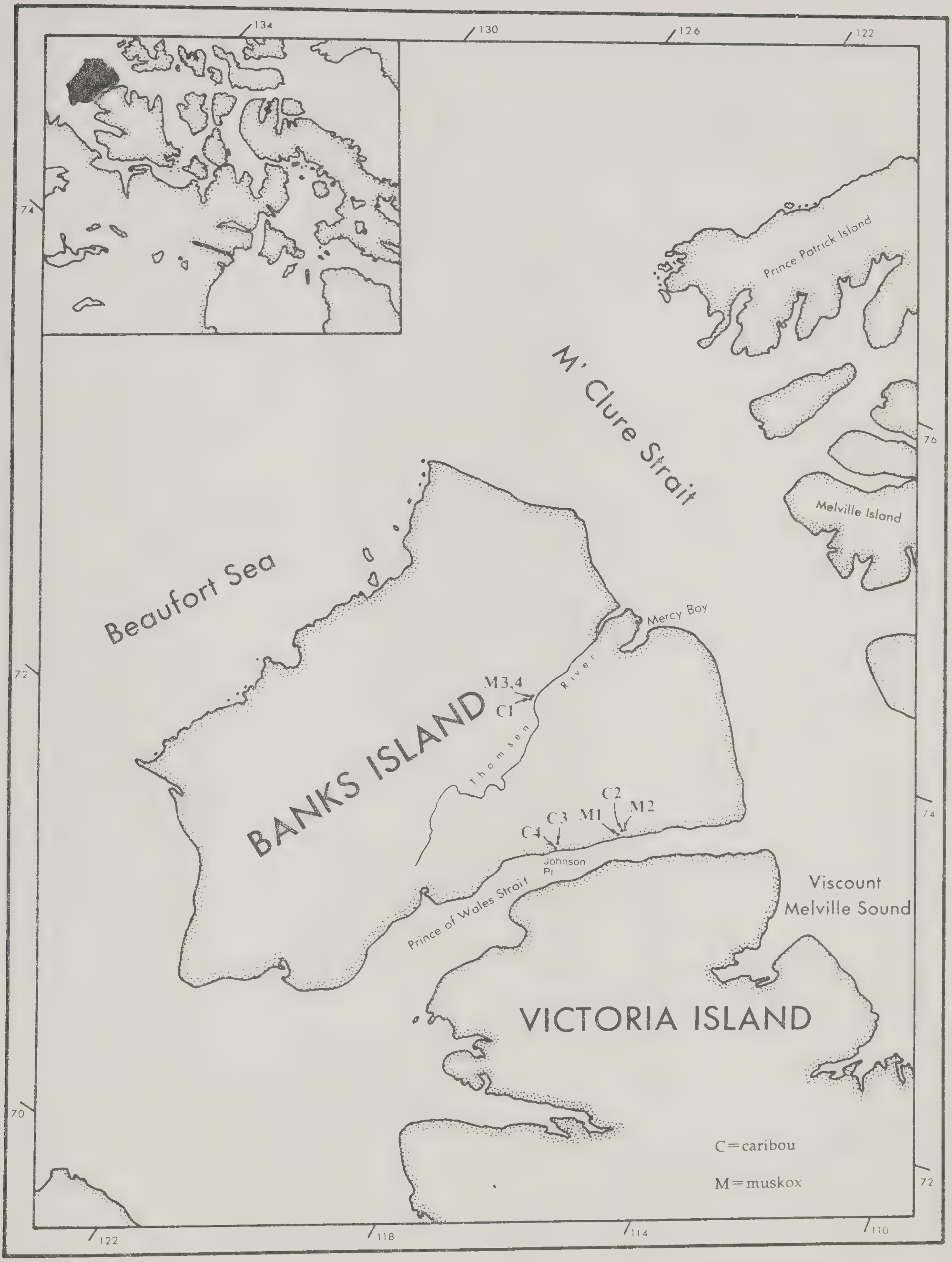
Plate 4: Caribou axial skeletal parts abandoned by scavenging arctic foxes.

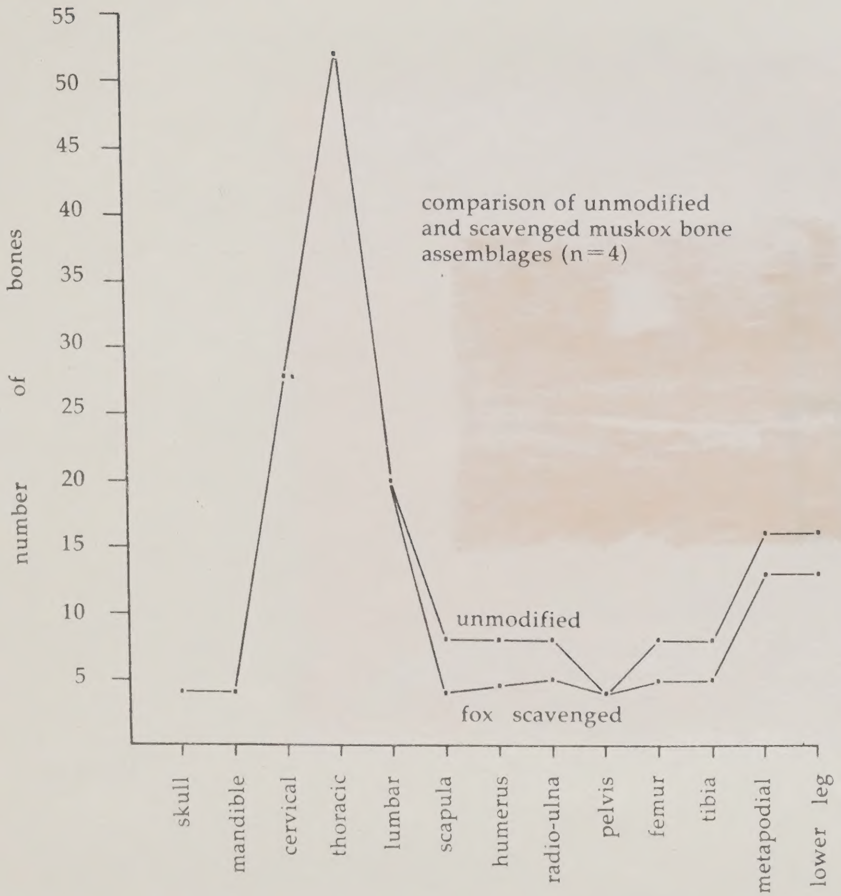
List of Figures

Fig. 1: Location of scavenged muskox and caribou carcasses found on northern Banks Island, N.W.T.

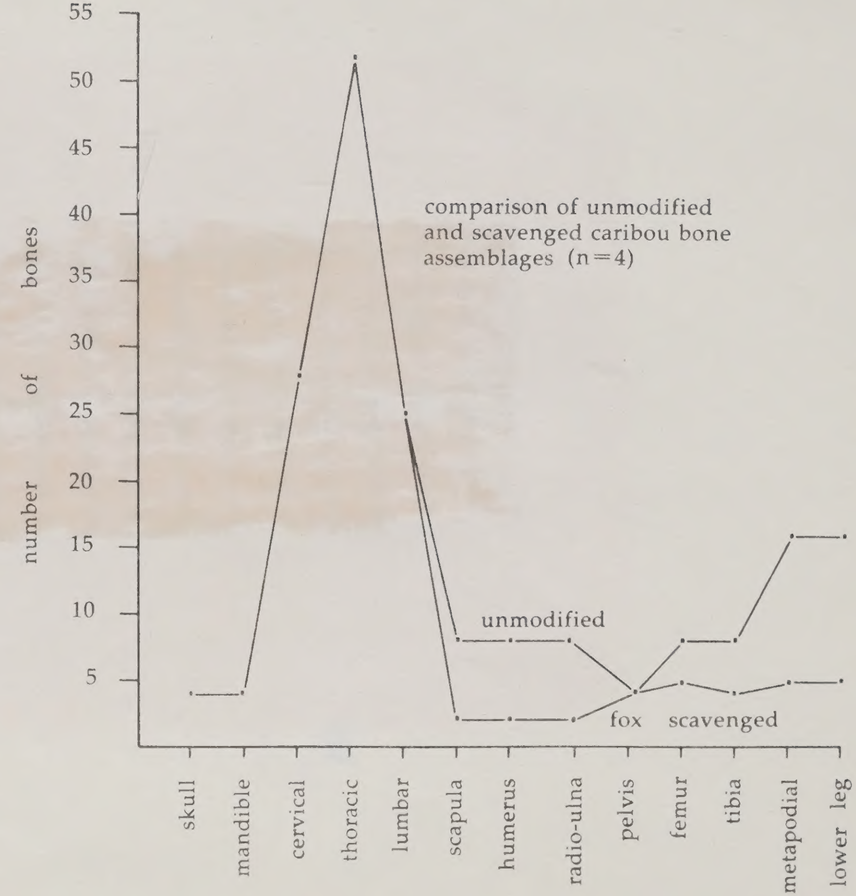
Fig. 2: A comparison of bone element frequencies between scavenged muskox (a) and caribou (b) skeletal assemblages.




134
130
126
122
74
Prince Patrick Island
M' Clure Strait
76
Melville Island
Beaufort Sea
Mercy Bay
72
M3,4
C1
Thomsen River
BANKS ISLAND
C2
M1
M2
C3
C4
Johnson Pt
74
Viscount Melville Sound
Prince of Wales Strait
VICTORIA ISLAND
70
C=caribou
M=muskox
72
122
118
114
110



comparison of unmodified and scavenged muskox bone assemblages (n=4)



comparison of unmodified and scavenged caribou bone assemblages (n=4)

Date Due

53282

Pam:902
WILL

WILL, Richard T.
AUTHOR

Archaeological implications of ungulate carcasses scavenged by Artic foxes.
TITLE

DATE LOANED	BORROWER'S NAME	DATE DUE

53282

BOREAL INSTITUTE FOR NORTHERN STUDIES, LIBRARY
THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA T6G 2E9
CANADA

University of Alberta Library
0 1620 0338 2940